

THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume XV

NOVEMBER, 1942

No. 9

A.S.M. Forms New Chapter In Georgia

Hailing from all parts of Georgia, 100 men who work with metals whether it be at forges or lathes, in the drafting rooms or in the management of plants, met in Atlanta on Nov. 2 to complete organization of the Georgia Chapter of the American Society for Metals.

At the organization meeting William H. Wilkerson of the Auto-Solier Co., Atlanta, was elected chairman; W. L. Clifton, Jr. of American Art Metals Co., vice-chairman; M. R. Creasy of National Traffic Guard Co., secretary; and R. J. Race, Scripto Mfg. Co., treasurer. "We have formed here tonight," said Mr. Wilkerson, the newly elected chairman, in his acceptance speech, "a group that demonstrates two big things about America, and why we will win this war. First, our group is truly democratic. Some of us work with our hands, some of us sit at tables, at desks—but all of us are a team doing a job."

Welcomed by Southern Chapter

"Second," he continued, "we are from concerns who may be in direct competition with one another, and yet we feel we can meet this way, exchange information, and even visit each other's plants to find out how certain things are done. You are welcome to come into my plant, and I know I am welcome in your plant if that visit will aid the war effort."

The new group was welcomed to Atlanta by H. Carl Wolf, president (Continued on page 2, column 4)

Parker Explains AISI Evaluation of Steels

Reported by Stewart M. DePoy

Delco Products Division
General Motors Corp.

Dayton Chapter—An interesting lecture on National Emergency Steels by Charles M. Parker, secretary, General Technical Committee, American Iron and Steel Institute, opened the 1942-43 program on Sept. 16. Mr. Parker explained the method developed by his committee for evaluating steels on a theoretical basis.

Before Mr. Parker's lecture, the educational program for the year was discussed, with the probability that the subject will be NE Steels.

Coffee talk at the dinner preceding the meeting was made by Oliver W. Roberts, manager, Industrial Department, Dayton Chamber of Commerce. His subject was "Business and Community Development".

Both the dinner and technical meeting were presided over by Chairman Stanley France and Vice Chairman Guy Baker.

Silver Goes to War Title of New Broadcast

"Silver Goes to War", a new 15-minute broadcast available to A.S.M. chapters, is meeting with a very favorable reception in those cities where it has so far been presented.

This is one of several programs prepared by the National Office. Chapter officials make arrangements with local broadcasting stations for time on the air, and a member is then selected to give the program in cooperation with one of the station announcers.

Copies of "Silver Goes to War" for use in this manner may be secured from the A.S.M. headquarters at 7301 Euclid Ave., Cleveland.

Stagg's "Repeat Order" Pleases New Jerseyites

Reported by R. L. Rickett

U. S. Steel Corp. Research Laboratory

New Jersey Chapter—Members of the American Society of Tool Engineers were guests of the Chapter on Oct. 19, when Howard J. Stagg of the Crucible Steel Co. of America discussed "Hardening of Tool Steels", in his third appearance before the New Jersey Chapter.

Mr. Stagg stated that a repeat order is always a source of particular satisfaction to a salesman, and after listening to his excellent discussion, the large audience could readily appreciate why the repeat order had been placed.

Speaks for Practical Men

The speaker announced that his object would be to show how to produce strong and tough tools—and how to keep them in one piece during the process. His remarks were directed to the man who designs the tools and the man who does the heat treatment.

To show what happens when the various classes of tool steels are hardened and tempered, the speaker referred to the transformation diagram (S-curve or "TTT diagram") for a steel of each type and discussed ways in which the practical heat treater can use the information contained.

Particularly important is the fact that steel when quenched may remain entirely austenitic down to only moderately elevated temperatures and partially austenitic at still lower temperatures. Knowledge of this fact enables the heat treater to interrupt the quench and straighten the tool while it is still warm and largely austenitic, without any sacrifice in subsequent hardness.

"Shake Hands With Tool"

This knowledge also enables him to avoid the cracked tools which may result if he does not cool them to a low enough temperature before tempering.

A water-hardening steel may crack if it is allowed to become too cold before it is tempered; according (Continued on page 3, column 4)

CONGRESS & EXPOSITION FINEST IN HISTORY

PLANS FOR 1943

The Board of Trustees decided in 1941 that the annual convention of the Society and the National Metal Congress and Exposition would be in Chicago in 1943.

The Board realizes that it is impossible to make long-range plans and to determine what will be the conditions eight months from now when definite announcements should be made of A.S.M. plans for next fall.

Therefore, the Board of Trustees decided at their meeting in Cleveland on Oct. 30 that the Society should proceed with all its activities and arrangements as though this were a normal year, realizing that at any time something might occur which would cause them to change the plans, and that the Board would review the situation as it exists next summer and make an announcement at that time as to the type and extent of activities to be held at the Palmer House in Chicago the week of Oct. 18-22, 1943.



Orchids

To Harry F. Walther, assistant melting superintendent, Timken Roller Bearing Co., on his election as president of the Electric Metal Makers Guild.

—*

To Marvin J. Udy, vice-president in charge of research and technology, Chromium Mining and Smelting Corp., Ltd., on his election to the board of directors.

—*

To C. R. Austin, professor of metallurgy, Pennsylvania State College, on receipt of the degree of Doctor in Scientia by the University of Wales for his outstanding work in metallurgy.

—*

To National Forge & Ordnance Co., Irvine, Pa., on the presentation of the Army-Navy Flag, fourth award for excellence in production in less than a year. The other three were the Navy Ordnance "E" Pennant, the All-Navy "E" Burgee, and the first White Star for maintenance of standards.

Archer's Talk On War Steels Is Pitt Opener

Reported by Gerhard Derge

Carnegie Institute of Technology

Pittsburgh Chapter—The first fall meeting was appropriately devoted to a talk on "Steels for War and Peace" by Robert Archer, former national president of the Society and now chief metallurgist of the Chicago district, Republic Steel Corp.

Mr. Archer pointed out the shortages in alloying elements which have developed as a result of the increased tonnages of our war production efforts. The situation with regard to nickel, chromium, vanadium, molybdenum, manganese, and silicon was reviewed and it was emphasized that one of the most strategic metals of all is iron. All efforts to conserve alloying elements must be made with this in view.

NE Steels Not Exact Equivalents

In setting up the specifications for new NE steels, the committee of the American Iron and Steel Institute was forced to make changes dictated by necessity rather than desire, and a great many new alloy combinations were created. In using these alloys it must be remembered that each metal has its own distinguishing chemical and physical characteristics and that no two alloying elements will have exactly the same effect on iron.

(Continued on page 3, column 2)

Philadelphia Sets 850 As Membership Ceiling

In an effort to give the best possible service to its members commensurate with available facilities, the Philadelphia Chapter has set a membership ceiling of 850.

This figure is the maximum number of members that can conveniently be accommodated for meetings, educational courses, and other services the Chapter renders. When the membership reaches 850, according to Secretary Francis Opila, "all other applicants go on the waiting list, and as members are dropped for one reason or another, those on the waiting list will be taken in."

In his monthly letter to members, Mr. Opila continues, "We believe that people who didn't value their A.S.M. memberships before will do so now because we defy you to show us a better buy for \$10 than A.S.M. membership at any time."

Reasons for Its Great Success Shown in Report

The finest Metal Congress ever held in history took place in Cleveland during the week of Oct. 12. The high quality of the papers presented at the regular technical sessions and of the discussions in the War Production Sessions contributed specifically to the theme of the Congress—namely, "Increased Production of War Products".

The following summation of the Congress and Exposition was contained in the annual report of the secretary of the A.S.M. and was presented at the annual meeting of the Society at Hotel Statler on Wednesday morning, Oct. 14:

Board's Decision Justified

"The National Metal Congress and the War Production Edition of the National Metal Exposition now in session have evidenced proof of the sound judgment of the Board of Trustees in their decision to proceed with the holding of a Congress in which the emphasis was to be placed upon current problems, with 'Increased Production of War Products' forming the theme of the Congress."

"The general technical sessions held in the morning, and the afternoon and evening War Production Sessions, to which some 200 of America's leading metal men have willingly contributed and which have been complimented by capacity audiences, have marked a definite advance in the use of technical and practical meetings to aid the war effort."

Show Its Own Spokesman

"The War Production Edition of the National Metal Exposition, a 100% informational and educational activity, is its own best spokesman. Those who have had an opportunity to see it have been thoroughly convinced of the soundness of the action of your Board of Trustees in (Continued on page 2, column 2)

X-Rays Discussed at Second Meeting of New Michigan Chapter

Reported by Roy A. White

Instructor, Grand Rapids Junior College

West Michigan Chapter—The second meeting of the newly organized West Michigan Chapter was held Sept. 21 in the Rowe Hotel, Grand Rapids. It was attended by about 150 members and guests.

The speaker was Don M. McCutcheon, supervisor of all X-ray and metallographical laboratories at the Ford Motor Co. in Dearborn. His subject was "Industrial X-Ray and Inspection".

Mr. McCutcheon gave a discussion of a number of technical phases of the use of X-rays relating to metal thickness, tube voltages, types of films, and other matters of interest in the successful use of this inspection tool.

Frank Ward of the Grand Rapids Stamping Division of General Motors and Stanley Davis of Campbell, Wyant, and Cannon Foundry Co. were technical co-chairmen for the program, and led and entered into the discussion and question period after Mr. McCutcheon's talk.

The program was arranged by Herman Van Zyl, metallurgist at the Keeler Brass Co., vice-chairman of the Chapter, and chairman of the Program Committee.

Installed as New Officers of A.S.M.



Herbert J. French
President, A.S.M.



Marcus A. Grossmann
Vice-President

Herbert J. French, Technical Consultant, War Production Board, and in Charge of Alloy Steel and Iron Development, International Nickel Co., Was Installed as President of the American Society for Metals at the Annual Meeting Oct. 14. Marcus A. Grossmann, director of research, Carnegie-Illinois Steel Corp., is the new vice-president, and Vsevolod N. Krivobok, chief metallurgist, Lockheed Aircraft Corp., and Erle G. Hill, assistant general superintendent, Gary Works, Carnegie-Illinois Steel Corp., are two new directors. W. H. Eisenman was re-elected secretary of the Society.



V. N. Krivobok
E. G. Hill
Trustees

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THE REVIEW

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Ray T. Bayless,Editor
 M. R. Hyslop,Managing Editor

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 Volume XV No. 9

Foundry Shows Conversion to Gun, Armor Steel

Reported by A. E. Cartwright
 Chemist & Metallurgist
 Robert Mitchell Co., Ltd.

Montreal Chapter—Entertainment in the form of colored motion pictures depicting the plant and operations of Sorel Industries, Ltd., preceded the technical session on Oct. 5. The films were presented through the courtesy of P. H. DesRosiers, a director of Sorel Industries, who accompanied the showing with a running commentary.

An audience of 337 showed great interest in the subject for the evening—"Manufacture of Gun and Armor Plate Steel" by D. O. Davis, maintenance superintendent, Dominion Foundries and Steel, Ltd., Hamilton, Ont. In the absence of Mr. Davis because of illness, this paper was presented by W. D. Lamont, metallurgist of Dominion Foundries.

A detailed description of plant processes, illustrated by numerous slides, formed the basis of the paper, while accent was placed on methods adopted to convert existing plant from peacetime activities to intensive war production.

Much pioneer work has been carried out in development of gun and armor plate steels and some radical changes made from conventional practices in composition and processing. Notable in this respect is the development of a chromium-nickel-molybdenum type of steel for gun barrels.

In addition to gun and armor steels, this plant produces ship plate, tin and tern plate, and many varieties of steel castings for railroad and electric power plants.

NE Steels Compared To SAE, AISI Grades

Reported by E. J. Wellauer
 Metallurgist, Falk Corp.

Milwaukee Chapter—John Mitchell, metallurgical engineer, alloy steels, Carnegie-Illinois Steel Corp., presented an extremely interesting and instructive lecture on the new NE steels before one of the largest attendances in the history of the Chapter.

It was shown that the alloy situation is very critical and there is a definite need that the low alloy NE steels be accepted as standards. Charts indicating the substantial savings possible by using the residuals in scrap as a good portion of the alloying analysis were presented.

A history of the formation of the NE analyses showed that they were primarily dependent upon the interpretation of the end-quench hardenability curves. Physical properties were found to be intimately tied up with the hardenability and not necessarily related to the alloy content for hardnesses of 200 to 400 Brinell.

Mr. Mitchell presented data comparing the properties of various NE steels with the old higher alloyed SAE and AISI grades. In these few steels can be found a satisfactory substitute for any of the previously used steels.

OWI Will Loan Films On War Subjects

The Office of War Information has a large library of films on war subjects available for private and group showing. Titles include such subjects as aluminum, building a bomber, building a tank, power and ships.

A.S.M. chapters in the Cleveland district interested in using the films for chapter meetings should address Sunray Films, Inc., 2108 Payne Ave., Cleveland, for further information. Chapters in other districts should address the Bureau of Motion Pictures, Office of War Information, Washington, for the name of the closest distributor.

Congress & Expo Best in History

(Continued from page 1)

planning such an event and have emphatically so expressed themselves.

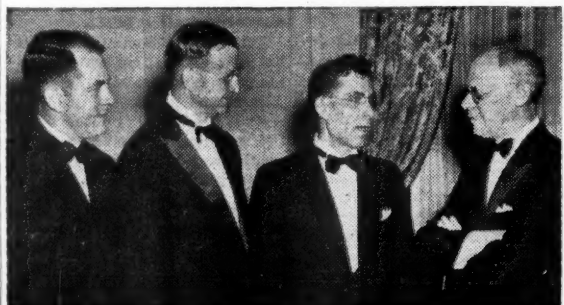
"The 315 manufacturing firms occupying all available area in Cleveland Public Auditorium are performing this week a meritorious service. They have assembled their best men to explain, to consult, to teach, to advise, and in every possible way to aid in increasing the production of war products. The men in charge of these educational displays, plus others in attendance and participating in all the sessions of the Congress, constitute the greatest mobilization of engineering talent and ability ever assembled anywhere in the world.

"These statements must in no way be construed as having been made as a defense for holding these events. No people more than the metal people realize that this is a war of metals, and no people more than the metal people will do more to win it."

Reports in Transactions

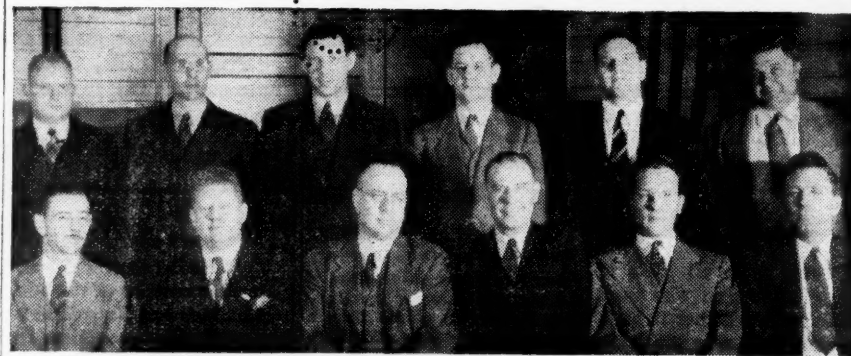
The complete text of the secretary's report, along with text of the president's and treasurer's reports, will be published in the December issue of TRANSACTIONS. The November issue of METAL PROGRESS carries an extensive account of the sessions and other activities of the National Metal Congress. See also the reports from the nation's press reprinted on the opposite page.

Medalists and Speaker at A.S.M. Dinner



Honored at the Annual Dinner of the A.S.M. on Oct. 15 were, Left to Right: Walter A. Schlegel, Henry Marion Howe Medal; Benjamin F. Shepherd, Sauvour Achievement Award; and John C. Garand, Special Award for the Invention of the Garand Rifle. At the extreme right is Louis P. Lochner, foreign correspondent, the principal speaker.

Executive Committee of New Chapter Has First Meeting



Officers of the New Georgia Chapter at the First Executive Committee Meeting on Nov. 4. Seated, from left, are Maurice May, chairman, Finance Committee; R. J. Race, Chapter treasurer; W. L. Clifton, Jr., vice-chairman; Wm. H. Wilkerson, chairman; M. R. Creasy, secretary; and J. R. Whitehurst, chairman, War Products Advisory Committee. Standing, from left, are B. H. Payne, Fred W. Thurman, J. P. Kiffle, H. W. Bittel, E. A. Anderson, and Jim Kukla.

Five Experts Cover Forged Steel Shells

Reported by P. H. Parker
 Metallurgist
 Continental Roll & Steel Foundry Co.

Calumet Chapter—The meeting on Sept. 15 at the Woodmar Country Club, Hammond, Ind., brought together a group of experts on each of the processes involved in producing forged steel shells.

The keynote, provided by Lieut. R. J. Dombrow, Army inspector of ordnance, Chicago Ordnance District, was the demand for accuracy in steel making, manufacturing processes, and inspection to insure shells of greatest damaging effect to the enemy. They must also be capable of being handled and fired by our troops without damage to them or their equipment.

Shells Exhibited

Lieutenant Dombrow exhibited shells and shell sections ranging in size from Garand rifle ammunition to 105-mm. high explosive shells.

Lieutenant Dombrow was assisted by Lieut. R. W. Milow, who explained the difference between present ammunition and that used in World War I—principally the replacement of shrapnel with instant contact high explosive shells.

The second speaker was W. E. Crocombe, president, American Forge Division, American Brake Shoe & Foundry Co., who discussed the forging of shells.

Upset Method Saves Steel

Tracing the history of the forged cavity shell, Mr. Crocombe told how it was replaced in World War I by the shell in which all cavities had to be finished after forging. Tremendous saving in steel is made possible by the upset method, which results in a saving of 15 to 20 lb. of critically needed shell steel in the manufacture of 105-mm. shells. Uniformity in steel is absolutely necessary to facilitate high production.

Heat treatment of forged steel shells was the subject of J. W. Halley, special metallurgist, Inland Steel Co. Quenching temperatures, quenching media and tempering methods that will give uniform properties to shell steel were out-

New Chapter Formed in Georgia; Officers Elected at Meeting Nov. 2

(Continued from page 1)

of the Atlanta Chamber of Commerce, and into the ranks of the American Society for Metals by F. W. Hanson, chairman of the Southern Chapter (Alabama), who pointed out the many benefits to be received by those who regularly attend the Society's monthly meetings.

"The speakers who come here will be leaders in their field" said Mr. Hanson. "From them you will learn things that have in the past been carefully guarded within the walls of the plants where they were developed. The secrets of the laboratory and of the shop will be laid before you by men who know what they are talking about, and who bring with them slides and charts and photographs and all the other appurtenances needed to teach you exactly how the new technics work.

"It is foreseen that as the result of this organization much war work will come to Georgia shops which

lined, and methods to facilitate these operations were pointed out.

The final speaker was H. F. Bassett of the Shell Division, Pullman-Standard Car Mfg. Co. He gave a description of the numerous machining operations and inspections a shell is subjected to from the time it is received from the forge shop until it is painted and accepted by the U.S. Army ordnance inspectors.

Ordnance Plant Met. Discusses Brasses

Reported by R. H. Stewart
 Metallurgist, The Prest-O-Lite Co., Inc.

Indianapolis Chapter—After an excellent steak dinner at the October meeting, Dr. A. E. Focke gave a brief resume of the National Metal Congress in Cleveland for the benefit of those who could not attend.

R. S. Pratt, metallurgist of the large new Bridgeport Brass Ordnance Plant of Indianapolis, presented an excellent technical discussion of the brasses. With the aid of slides, he covered the methods of manufacturing brass at the start of the industry and at the present time, showing the improved methods now in use for production in larger quantities employing raw materials processed with more exact metallurgical control.

Mr. Pratt explained the phase diagram for brasses, and the effects of the additions of other elements to the copper-zinc alloys. These included the addition of lead for improving machinability and the effects of iron, tin, bismuth, antimony, and other metals which are purposely added, or may be present as impurities.

The phenomena of "season cracking" and "dezincification" were thoroughly expounded.

A single aluminum piston for a Wright "Cyclone" airplane engine weighs only a few ounces less than all eight aluminum pistons for an eight-cylinder automobile engine.

heretofore have not had the knowledge necessary to execute such contracts, and that by war's end the Georgia metal working industries will have been greatly strengthened and made ready for the great forward strides which are expected to take place in the Southeast. We in Alabama have already benefited greatly, and have been enabled to increase materially our contribution to the war. You will have the same experience in Georgia, I am sure."

Committee Heads Named

The following men were elected to the executive committee of the new chapter:

C. E. Pittman, chairman, Membership Committee.

Maurice May, chairman, Finance Committee.

Jim Kukla, chairman, Arrangements Committee.

E. A. Anderson, chairman, Publicity Committee.

A. J. Mueller, chairman, Educational Committee.

Fred W. Thurman, chairman, By-Laws Committee.

Paul Keller, chairman, University Contact Committee.

J. R. Whitehurst, chairman, War Products Advisory Committee.

Grinding Wheel Is Compared to Milling Cutter

Reported by H. E. Hostetter
 Metallurgical Engineer
 Climax Molybdenum Co.

St. Louis Chapter—A. Rousseau, sales engineer, Norton Co., Worcester, Mass., who spoke at the September meeting on "Grinding Wheels and Their Applications", is the author of the Metals Handbook article on grinding and is able to draw upon an extensive background of practical experience in discussing this subject.

A grinding wheel can be considered as similar to a milling cutter with an extremely large number of teeth. Ideally, a particle of grit is released from the wheel bond after becoming dull. The removal of particles upon dulling exposes new, sharp grit, and thus the efficiency of the grinding wheel is maintained.

Careful study of the many factors involved in grinding has made it possible to design wheels especially suited for such jobs as grinding of precision instruments or surface conditioning of large alloy steel castings, to mention some extremes.

It must not be inferred, however, that a change in grinding wheels is always desirable when a slight change is made in the material being ground. If the change is to a harder or tougher steel, oftentimes a decreased production rate with the same wheel is the best solution.

Preceding the technical talk Frank Ackerman, Jr., production engineer, Curtis Mfg. Co., St. Louis, presented some interesting motion pictures of Denmark and Finland taken by him shortly before the outbreak of the present war.

What the Newspapers Said . . .

The service which the American Society for Metals is rendering in the war effort and the value and importance of the part which the recent National Metal Congress and Exposition played might well be judged by four editorials published in the Nation's press.

Two of these appeared in Cleveland papers (the *Press* and *Plain Dealer*), but the other two come from a much farther removed source—namely, the New Orleans, La. *Times-Picayune* and the Boston *Post*. Text of the editorials follows:

The Metal Congress

PROBABLY never before has a convention the size of the National Metal Congress come to Cleveland with as little fanfare, nor can we recall one that has stuck as strictly to business. Yet it is safe to say that aside from the national political conventions none has ever been as important to the country as the one now being held at Public Hall.

The 10,000 delegates now in our midst are not here for fun. They came as leaders of a home front army to exchange and pool information of value in carrying on their end of the war. We are sure they will realize that the reason Cleveland has not made more fuss over them is our appreciation of the job they have to do and of their need for all the available time in which to do it.

Nevertheless, we do heartily welcome the congress and are glad that our city has the facilities to accommodate a gathering of such size and importance.

The Cleveland Plain Dealer
Oct. 14, 1942

This War of Metals

MASTER minds of technical strategy in the field of metals are meeting in Public Auditorium this week, in the National Metal Congress. The subject matter of this congress is less understandable to most of us and less controversial—because subject to exact research—than such things as the second front. At the same time, these technical discussions in Cleveland may have a direct bearing on all military decisions.

Dr. Bradley Stoughton, president of the American Society for Metals, pointed out that this is a war of metals. Hope for victory rests largely on America's metal industry, and victory can be brought about only by pooling ideas and information. This is the reason for having a 1942 Metal Congress—to take up in detail the technical moves that must be made to win the home front battle, on production lines.

There will be no factory junkies, but many exhibits and information on substitute materials, speed-up methods, and short cuts. Among the speakers are men from the armed services and the War Production Board. They will discuss the intimate details in a general pattern: how to hurl the most metal with the utmost effectiveness at the enemy.

Significantly, the man to be honored at the Society for Metals annual dinner Thursday night is John C. Garand, inventor of the semi-automatic rifle which Army men say has made the United States Army the "best armed in the world". The Garand rifle, official weapon of Army and Marines, is one of the exhibits, sponsored by Army Ordnance through its Cleveland district office.

The Cleveland Press
Oct. 13, 1942

Metallurgic Magic

THE nation's metallurgists, in congress at Cleveland, are telling a little of the story behind scarcities, and of the part they have played in making ends meet. It is a story of jugglings and substitutions to save both material and work; of maintaining the "martial" qualities of weapons, munitions and armor on shortened rations of necessary elements; of increased production to keep those rations from being shortened further. Because steel is precious, a gun formerly requiring 56 pounds of it is now turned out

with only 14; because brass is more precious than steel, the latter is substituted in big shells and in ordnance parts.

The outlook for sufficient supplies of such hardening and toughening agents as chromium, vanadium, tungsten, molybdenum and nickel is described by William P. Woodside, founder of the American Society for Metals, as "very encouraging". At the same time, at least one of the auxiliaries previously considered vital to the manufacture of armor has been dispensed with altogether and the use of others has been reduced without unsatisfactory effect, he states, upon the quality of armament and cutting tools. An example of increased production—quadruple the output of two years ago—is cited in the case of molybdenum.

Metallurgists have more reason for self-satisfaction over this rising to the occasion, in that they persistently pointed to the indicated shortages in both prime and auxiliary metals that war conditions would produce. Their advice was heeded to a limited degree in the acquisition of certain stocks of strategic minerals; had these stocks been laid in heavily, the difficulties of transition would have been eased. But even the metallurgists did not foresee the scope of war production as it is developing, or the relationships which would find the United States shipping, or trying to ship, its own scant supplies to fighting allies. Nor did they properly estimate their own abilities to eliminate some of the "impossibilities" of their trade, and the inventiveness, ingenuity and managing which are created in the forge of war and necessity.

New Orleans Times-Picayune
Oct. 13, 1942

More With Less

IF MORE incentive is needed for gathering every scrap of scrap it is contained in the reports made at the National Metal Congress meeting in Cleveland. Thanks to resourceful American metallurgists, a gun that once needed 56 lb. of steel is now being made with 14 lb. Shells formerly made of brass are now manufactured from steel. These are but two of many ways that American science has found to make more with less. You may be sure that your scrap will be made to go far—clear to Tokyo, Berlin and way stations.

The Boston Post
Oct. 13, 1942

Discusses X-Rays From Low to Million-Volt Unit

Reported by E. R. Parker
Metallurgist, General Electric Co.
Schenectady Chapter—An excellent illustrated discussion of modern commercial radiography was given by C. D. Moriarty at the October meeting. Applications of X-rays covered by the speaker ranged from low voltage fluorescent examination of light metal castings to the use of the million-volt unit for heavy steel parts.

Charles Moriarty is in charge of the radiographic laboratory of the General Electric Co. He was the first user of the million-volt tube, and has pioneered in the field of fluorescent examination and in the application of stereoscopic views to X-ray examination.

Half the meeting was devoted to the lecture and the remainder to discussion.

If the tin coatings could be stripped from 5000 steel cans, they would make a pile only 1 in. thick.

War Accelerates Field for X-Ray Metal Inspection

Reported by Michael Field
Research Department
The Cincinnati Milling Machine Co.
Cincinnati Chapter—Sixty members convened at the Netherland Plaza Hotel on Oct. 8 to hear William Maxwell Lee, chief of the Industrial Radiography Division of the Kelley-Koett Mfg. Co.

Mr. Lee's subject was "Radiographic Inspection of Industrial Materials", one of the four important fields for X-ray inspection. The other three are the medical profession, the food industry, using fluoroscopic inspection, and X-ray diffraction for metal and crystal analysis.

The war has tremendously accelerated the field of industrial inspection of metals. Ferrous and non-ferrous castings are being X-rayed to locate cavities, blowholes, porosity, and sand inclusions. Imperfections can be uncovered while satisfactory work can be ascertained without resorting to destructive tests.

Welded seams of plates are X-rayed to locate hidden defects. The A.S.M.E. Boiler Code specifies that X-ray examinations be employed to check the welds in pressure vessels.

It is possible by X-ray examination to uncover a variation of 2% in thickness in a path parallel to the X-ray radiation.

Mr. Lee described the basic X-ray equipment required for such inspection, and named precautions that are taken to protect the workers against excessive radiation. He recommended the use of stationary equipment properly isolated in a separate room.

Mr. Lee had on display X-ray plates of several interesting parts which clearly illustrated the value of X-rays as a flaw detector.

Primers for artillery shells are now being made by a former manufacturer of ladies' compacts.

Scrap Residuals Provide Much of Alloy in Steels

Reported by James C. Erickson
Deere & Co.

Tri-City Chapter—L. S. Bergen, associate director of metallurgy and research, Crucible Steel Co. of America, opened the 1942-43 lecture series with an up-to-the-minute address entitled "NE (National Emergency) Steels".

The meeting was held at the Hotel Fort Armstrong, Rock Island, Ill. G. T. Williams, Chapter chairman, introduced the speaker to the large audience.

Our present shortage of steel may be attributed to two causes: (a) Insufficient plant capacity and (b) insufficient raw material. The speaker concentrated his discussion on the latter of the two causes and showed how we are substituting emergency steels to relieve this situation.

Fortunately, Jominy and Grossmann have furnished metallurgists with valuable tools, the end-quench hardenability test and a method of calculating hardenability from chemical analysis. Both of these have made the job of finding a substitute steel much easier.

When it became necessary to find emergency steels, it was first necessary to determine just what raw material was available. Incidental nickel, chromium, and molybdenum in steel scrap furnish a residual alloy content in steel averaging approximately 0.20% Cr, 0.21% Ni, and 0.05% Mo.

With this knowledge at hand and with the use of Grossmann's tables, the metallurgist is able to estimate just what alloys and their amounts to add to the scrap residuals to obtain the desired alloy steel.

The speaker's discussion of the properties and chemistries of the present NE steels was accepted with keen interest by his audience.

What the Trade Papers Said . . .

The following extracts from the two leading metallurgical weeklies, *Iron Age* and *Steel*, are taken from their reports of the National Metal Congress and Exposition held in Cleveland the week of Oct. 12.

They are quoted here as evidence of how this year's War Production Edition successfully fulfilled its purpose in stimulating "Increased Production of War Products", the theme of the entire Congress and Exposition.

War Problems Probed

LAST week the men who will have much to do with the ending of the Second World War went to Cleveland. There, without fanfare, these men, American metallurgists and engineers, discussed in sober tones ways and means of speeding the nation's war production.

Few gatherings in 1942 will rate with this meeting, the 24th National Metal Congress and Exposition, in importance to the war-torn world awaiting the torrent of weapons from United States plants to bring the peace.

This gathering of an industry at war dramatized the sharp changes it had gone through in the course of a little more than a year. It showed a mature, highly organized machine which had suffered the pains of conversion, the struggles for vital raw materials. Its leaders were veterans—without uniforms.

Despite the mighty accomplishments of this metal industry in the past, its ever-expanding production goal has been accompanied by new and complex problems. And it was to seek out the answers to some of these problems that more than 46,000 metallurgists and engineers came to Cleveland last week to the National Metal Congress, sponsored by the American Society for Metals, the American Welding Society, the American Institute of Mining and Metallurgical Engineers and the Wire Association.

Information Pooled

The sober atmosphere of a nation at war also pervaded the vast Cleveland auditorium that housed the exhibition of machinery and supplies which was held simultaneously with the technical sessions.

The current demand for equipment made it impossible for many exhibitors to show their new products. There was a notable absence of working exhibits.

A trip about the Exposition Hall

"Repeat Order" Pleases Jersey

(Continued from page 1)

ing to the speaker, the proper time to temper is when the tool is just cool enough to handle.

An oil-hardening steel may be removed from the quenching oil when still at 350 to 400° F. for straightening or to slow up the subsequent cooling rate if there is danger of cracking. However, any steel should always be cooled down to a much lower temperature ("when you can shake hands with the tool") before it is tempered.

Problems of Design Illustrated

It is recommended that high speed steel be tempered a second time to temper the martensite which forms from retained austenite upon cooling from the first tempering operation.

Mr. Stagg illustrated by slides the way in which improper design of the tools may cause trouble in heat treatment and the use of special quenching fixtures to overcome some of the difficulties imposed by irregular sections or special shapes.

This lecture was an excellent example of that desirable but rare ability to apply sound fundamental principles to the operations of a practical art.

At the conclusion of the dinner preceding the technical meeting, W. L. White, director of laboratories of Raybestos-Manhattan, Inc., discussed the development of synthetic rubber and the relationship between the present rubber supply and our requirements.

showed, however, that the manufacturers, despite the handicap of the lack of equipment for the exhibits, were putting this opportunity to contact thousands of America's outstanding metallurgists and engineers to good use. In every booth could be seen bull sessions, with the exhibitors' service men mulling over problems with their equipment users.

This ready pooling of information, so noticeable at the Exposition Hall, carried, with emphasis, through all the technical meetings at the Congress.

One of the outstanding features of the Congress this year was the group meetings on war production, patterned after last year's "defense meetings". Such problems as the working of aluminum sheet, the metallurgical aspects of the NE steels, the training of men and women for new jobs, the use of low tin alloys, reclamation, increasing the yield of electric furnaces, and the use of powdered metals, to name a few topics, were discussed by eminent authorities.

Meetings Well Attended

These meetings were all extremely well attended and, judged by the spirited discussions which developed from the floor, the subjects selected for discussion were all timely. As some of these discussions bordered on material restricted by censorship, they were all kept off the record and cannot be reported.

The Iron Age
Oct. 22, 1942

NE Steels Hold Interest

OUTSTANDING feature of the 1942 National Metal Congress and Exposition in Cleveland's Public Hall Oct. 12-16 was the series of discussion meetings in which leaders of government and industry spoke on important phases of war production problems.

Typical were the meetings Monday afternoon and evening devoted to the NE (National Emergency) steels. Under the leadership of G. M. Parker of the American Iron and Steel Institute, such authorities as W. E. Jominy, chief metallurgist, Dodge-Chicago plant of Chrysler Corp., and Glenn C. Riegel, chief metallurgist, Caterpillar Tractor Co., gave short talks on their experience with various NE steels. Following brief presentations by eight or ten such authorities, there were general discussions. Much helpful information was given in answer to specific questions.

The 23 sessions are considered to be of great value in facilitating the war effort, since they permitted many men to consult with experts and thus solve technical problems in the shortest possible time.

With more than 300 exhibitors, and an attendance of more than 10,000 the first day, total attendance was expected to compare favorably with last year's record, although exact figures were not available at press time.

Welding Society Reviews Progress

Welding's prominent place as a production shortcut in fabricating ships, tanks and much other military equipment is well illustrated by steelmakers, fabricators and suppliers who sent more than 10,000 men to the 23rd annual convention of the American Welding Society in Cleveland Oct. 12-15.

As part of the 1942 National Metal Congress, the Society program included 57 papers, 15 technical sessions, annual business meeting, banquet and session for awards. . . . Steel, Oct. 19, 1942

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Mitchell and Whitney Break All Records

Reported by W. G. Patton
Climax Molybdenum Co.

Detroit Chapter—It required the combined talents of H. LeRoy Whitney, technical consultant to Donald M. Nelson, and John Mitchell, metallurgical engineer of Carnegie-Illinois Steel Corp., to turn the trick, but the net result of their able efforts on behalf of the NE steels in Detroit produced an all-time attendance record.

Between 500 and 600 members and guests were on hand Oct. 6 at the Rackham Building, eager to learn first-hand about the properties of NE steels and their prospects. It seemed almost superfluous to add an "Information Please" board of experts, but this was done presumably to bring many points of view into the picture.

Shows Difficulties Faced by WPE

Mr. Whitney bore down hard on the thesis that the war is closer than we think. Summarizing the difficulties faced by the War Production Board, he showed convincingly that the job of coordinating and balancing a war program through every step from iron ore to ingots to tanks to transport to fighting front is a job in which the metallurgist and the engineer must pull together in double harness.

The speaker emphasized that this is indeed a war of steel. Our resources are being depleted at an unheard-of rate. Problems that were inconsequential yesterday have today reached alarming proportions—problems like scrap shortage, iron ore deficiencies and the extremely tight position of several of the alloying elements.

Cooperation in its finest sense, he said—cooperation of the kind that actually sees virtues in life-long competitors and self denial that bears its burden with patience, no matter how tough the going—this is the spirit that will win this war. Anything short of this stands a good chance to lose it!

In concluding his remarks, Mr. Whitney paid glowing tribute to Harry W. McQuaid and the co-speaker, John Mitchell. Both men, he said, have rendered the country a great service in a period of great national need.

Mr. Mitchell's talk has been reported previously in *The Review*; a brief summary is all that is required here. The speaker presented an in-

Detroit NE Steels Speaker



H. LeRoy Whitney, Left, Technical Consultant to Donald M. Nelson, Speaker on NE Steels, and V. A. Crosby, Detroit Chapter Chairman.

teresting statistical picture of the alloy situation, showing respective tonnage percentages of the several low alloy types. The present supply and projected demand for the several alloying elements was then described.

Finally, it was demonstrated that the new NE series would effectively remove the pressure on the critical elements—particularly nickel and molybdenum—thereby pointing toward an effective solution of our unprecedented alloy problem.

"Experts" Panel Leads Discussion

Probably if 50% of a panel of experts show up at an A.S.M. meeting nowadays that is all that can be expected. Calls to Washington, out-of-town business and a bad cold reduced the "expert" panel from eight to four, thereby forcing each remaining member to supply twice as much knowledge as would otherwise be expected of him.

Roy Roush turned in a fine job, pinch-hitting for Paul Eddy, as technical chairman. Other members of the panel were Bob Schenck, Al Mann and H. W. McQuaid, assisted by John Mitchell.

Mitchell explained that little work has been done on NE steels up to the present time where the steel is normalized and drawn in large sections. Harry McQuaid clarified the use of nickel in the NE and other steels.

Reports on the machinability of the new steels, with the possible exception of NE 8949, are highly favorable, Mitchell stated. There were also questions relating to abrasion resistance, distortion and other physical characteristics of the new steels.

Essential Uses Take All Stainless

Reported by W. J. Kollas
Chief Engineer
Montag Stove & Furnace Works

Oregon Chapter—The initial gathering of the Chapter, held at Hotel Heathman, Portland, Oct. 9, was opened with a business meeting during which committee appointments were announced. After a short recess a film on "Heat and Its Control" by Johns-Manville Corp. was presented.

Program Chairman Chisholm then introduced the guest speaker, R. E. Brown, division manager of the Electro Metallurgical Sales Corp. of San Francisco, who spoke on "Stainless Steels for the Process and Equipment Industries".

He stated that essential uses are now taking all the available supplies but predicted that uses would become greater and especially in plane construction. Mr. Brown then said that while there are about 50 compositions of stainless steel, they all may be classified as either martensitic, ferritic, or austenitic.

Other detailed information was given regarding physical properties and structures of the various types, after which the meeting was thrown open to discussion.

E.W.P. Smith, Welding Expert, Is Found Dead

EDWARD W. P. SMITH, 56-year-old consulting engineer for the Lincoln Electric Co., and a nationally known authority on arc welding, died suddenly Oct. 3. Mr. Smith was found dead in his berth aboard a train returning from Indianapolis, where he had given a lecture before the American Welding Society.

A veteran of more than 20 years' service with the Lincoln Company, Mr. Smith had traveled extensively in the last year in the interests of the war production program, conducting many welding courses.

He was born in Cleveland and was graduated from Colorado College, Colorado Springs, with a degree in electrical engineering. Before joining Lincoln Electric as a tester, he had worked in the electrical inspection department of the City of Cleveland and for the Westinghouse Electric & Mfg. Co. in Pittsburgh.

In addition to membership in the A.S.M. and A.W.S., Mr. Smith belonged to the American Society of Mechanical Engineers, the American Society for Testing Materials, and the Cleveland Engineering Society. He was co-author with A. F. Davis of the Procedure Handbook of Arc Welding Design and Practice.

Charles Raab

CHARLES RAAB of Battelle Memorial Institute, Columbus, who died recently, was an active member of the Columbus Chapter and a former member of the Executive Committee. He was in charge of the tool room at the Institute since its inception.

Ernest F. Davis

E. F. DAVIS, who died recently in Muncie, was for many years chief metallurgist of the Warner Gear Division of Borg-Warner Corp., and had pioneered in gas carburizing and cyclic heat treating.

War Puts End to Some 4000 Steel Special Analyses

Reported by R. E. Christin
Metallurgist, Columbus Bolt Works

Columbus Chapter—"The country's entrance into the war effort predicated the end of the 2500 to 4000 different pre-war analyses which were developed in order to fit individual shop conditions and in some cases personalities," said Joseph H. Jones, metallurgist, Republic Steel Corp., Alloy Steel Division, discussing "National Emergency Steels and Their Properties and Applications" at the September meeting.

Much dependence is placed on the end-quench or Jominy test for hardenability to determine which analysis shows properties that best coincide with the steel that is to be replaced. A brief description of the test and several examples were cited to prove the possibilities of the NE steels developed to conserve alloys.

Residual elements such as chromium, nickel, and molybdenum are utilized from the scrap, thereby requiring lower additions of virgin alloy.

Other arguments for these NE steels, according to the speaker, are the uniformity of hardenability from heat to heat, and the noticeable decrease in heat treat distortion on certain grades. These statements were backed up with proof in production processes of sufficient magnitude to be convincing.

A comparison of dilatometer curves of higher alloys vs. NE grades gives a clue, said the speaker, for the decrease in distortion. The talk was illustrated with physical property charts and microstructures as well as hardenability curves.

In concluding, the speaker made an earnest appeal to get behind the alloy conservation program and help stretch our available supply as far as possible before we are forced to do so.

Seven Essential Points Named in Silver Brazing

Reported by H. P. Henderson
Production Engineer
New Departure Mfg. Co.

Hartford Chapter—An informal talk on "Silver Brazing—Fundamentals and Applications" was given by Henry DeM. Lucas, industrial engineer for Handy & Harman of Bridgeport, at the October meeting.

Mr. Lucas' formula for successful silver brazing depends on seven essential points, namely:

1. Good fit—0.001 to 0.003 in.
2. Clean metal surface.
3. Proper fluxing.
4. Assembly.
5. Heating.
6. Flow of the alloy.
7. Final cleaning.

These essential points were amplified by slides showing difficult assemblies and repaired tools such as broaches and taps, all of which are of vital interest today.

Centerless Grinders Facilitate Rapid Shell Production—Mehlhope

Reported by Michael Field
Research Department
The Cincinnati Milling Machine Co.

Cincinnati Chapter—How rapid and precise production of shells is made possible by the use of centerless grinders was shown by L. E. Mehlhope, field engineer of the Cincinnati Milling and Grinding Machines, Inc., in a talk on "Shell Grinding" at the first meeting of the season on Sept. 15. The American Society of Tool Engineers also participated in the meeting.

Mr. Mehlhope reviewed the theory of centerless grinding and then illustrated by means of slides the application of these machines to the particular set-ups necessary for mass production of shells.

Shells are ground by through-feed or in-feed methods, the former being the most desirable since it makes possible a higher production rate. The through-feed method, however, is limited to shells of a single diameter.

Shells of multiple diameters or shells which require form grinding must be accomplished by the in-feed process. To increase production with the in-feed process special loading and rejecting devices have been developed which reduce the handling time to a minimum.

A very large variety of types and sizes of shells can be handled by centerless grinding, and Mr. Mehlhope had a display of many typical examples.

Refreshments were served after the talk and were followed by three talking motion pictures on current events, one of which was the interesting "Battle of the Coral Sea and Midway Islands". Two hundred members attended the meeting.

"Methods Engineers" Evaluate Cutting Oils

Reported by W. J. Kollas
Chief Engineer
Montag Stove & Furnace Works

Oregon Chapter—Regular business was dispensed with, and the special meeting on Oct. 16 was turned over to Vice-Chairman Colin Chisholm, who introduced George S. Rogers, president and metallurgist, G. S. Rogers & Co. of Chicago.

Mr. Rogers' subject, "Cutting Oils", was a timely one and of especial interest during the present emergency when every machine in every plant must turn out work at maximum production.

In his talk he stated his primary goal was to help the plant man meet and whip the problems which are continually arising. He said that most production plants now have "methods engineers" who have taken time to evaluate cutting oils, with great assistance to industry in both production and costs.

Mr. Rogers discussed in detail the two classes of straight and soluble cutting oils for all cutting and grinding operations.

Worcester ASM-WPAC in Session



The War Products Advisory Committee of the Worcester Chapter Photographed at a Recent Meeting. Seated, left to right, are Charles H. E. Coster, Chester M. Tuman, coordinator, Thomas C. Bradford, and Herbert H. Wagner. Standing, left to right: Orum R. Kerst, Andrew J. Huston, Harold T. Burke, John H. Hitchcock, Warren Van N. Baker, and Carl G. Johnson. Another member of the committee, A. J. Pepin, was unavoidably absent from this meeting.

National Emergency Steels

A 36-page pamphlet giving the latest engineering data on the new NE steels. Compiled by the American Society for Metals largely to aid its numerous War Products Advisory Committees, this booklet should also be of immediate use to anyone dealing with the new steels.

25c per copy

Send coin or stamps to

AMERICAN SOCIETY FOR METALS

7301 Euclid Ave. Cleveland, Ohio



A. S. M. Presents a Report on Its War Activities



THE ability of individuals to adjust their activities from a peacetime to a wartime basis should be a necessary requisite for a technical society. In such a transition the A.S.M. has adjusted itself rapidly and has initiated activities which are credited as making valuable and outstanding contributions to the war activities of the nation.

The following outline of the activities in which the A.S.M. has been engaged represents two stages of action, the first, that performed during the defense period, and the second, the all-out added emphasis which began Dec. 7, 1941.

EDUCATIONAL SERVICE

It was in September 1939 that the executive committee of the Philadelphia chapter received a request from army and navy authorities in Philadelphia to arrange some type of educational work which would be of assistance to the individuals engaged in the inspection of metals at the Arsenal, Navy Yard and Aircraft Factory, as well as those located at other manufacturing plants making war materiel.

The chapter accepted the responsibility and within two weeks had arranged a series of ten lectures on the Inspection of Metals, which course was carried to a most suc-



cessful conclusion with an attendance of approximately 800.

The opportunity to do this type of educational service for the rapidly expanding war products manufacturing personnel and the government was immediately accepted by many other chapters of the Society and practically all of them have at some time or another within the past 18 months presented educational courses on inspection or metal preparation or fabrication. These have been attended by some 10,000 enrollees.

INSPECTION TEXTBOOK

As a result of the inspection courses presented by the chapters, it became evident there was not a satisfactory text dealing with the subject, and while much splendid teaching material was contained in a number of A.S.M. books and was used quite extensively, including the reprinting of many sections of the National Metals Handbook, nevertheless the Board of Trustees determined that it would be a national service if a text on the inspection of metals was prepared. Consequently, the Board authorized the preparation and publication of such a text and ruled that the book was to be sold at the cost of production.

Mr. Harry Pulsifer was secured to write the book, which is now in its fourth printing, circulation being approximately 10,000 copies. It has been ordered extensively by individuals and various A.S.M. chapters and colleges presenting engineering extension courses.

MOLYBDENUM STEELS

In June 1941 a request was received from the Office of Production Management (WPCB), requesting the

Society to appoint committees and prepare recommended practices for the preparation, use, and treatment of molybdenum high speed steels inasmuch as the shortage of tungsten necessitated the promulgation of a ukase requiring a 50:50 basis for the purchase of molybdenum and tungsten high speed steels.

The Society responded immediately and under the direction of J. E. Donnellan, secretary of the Metals Handbook Committee, the work was completed in the short period of two months and the report submitted to OPM where thousands of copies were prepared and distributed to industry, to the technical and trade press of America, Canada and England.

In addition to the preparation of the recommended practice on the handling of molybdenum cutting steels, many chapters of the Society held special meetings at which the subject of molybdenum steels was presented by experts and an opportunity for extensive discussion was made available. In these ways the A.S.M. assisted materially in the rapid change-over by industry from tungsten to molybdenum cutting steels.

CONSERVATION OF METALS

The Society was invited to have a representative attend a meeting in Washington on the subject of conservation and substitution (August 18, 1941). At that meeting a request was made by the then-chairman that the technical society secretaries there present should initiate an active campaign to acquaint all of their members with the necessity for conservation and substitution and thus endeavor to assist by an extensive and intensive educational campaign to acquaint their membership with the present situation relative to strategic and critical metals.

The Society was pleased indeed to lend every aid possible and immediately arranged for a series of 14 meetings on Defense Problems, Conservation and Substitution which were held during the National Metal Congress and National Metal Exposition, Philadelphia, the week of Oct. 20, 1941. One hundred and six members of the Society, of the 110 invited, accepted the invitation to prepare papers on the subject of critical metals and their substitution and conservation and so the result was a program of outstanding helpfulness and exceptional benefits which drew heavy attendance and was recognized as a meritorious service to the government and to industry.

NATIONAL METAL CONGRESS

At 11:30 on each of the five days of the Philadelphia meeting of the National Metal Congress the entire attendance left the sessions in which they were engaged and assembled in the large ballroom of the Benjamin Franklin Hotel where they were addressed by government officials who indicated how the men of the metal industry could better cooperate and assist in the defense program. The speakers for these sessions were Major General Jacob L. Devers, Commanding General of the Armored Force, U. S. A.; Lt. Commander J. G. Crommelin, Bureau of Aeronautics, U. S. N.; Rear

A Pledge

War has given the Metal Industry a new job to do—new heights to attain. To meet this challenge—to help accomplish this job in the shortest length of time—the American Society for Metals has dedicated its activities and purposes for one common goal—Production for Victory.

Admiral Thomas Craven, U. S. N.; Mr. Alex Taub, Consultant, Office of Production Management.

At the same time the National Metal Exposition, held concurrently with the Congress, had as its theme "New Aids to Production", and the manufacturers arranged their exhibits to emphasize that point. The largest number of firms in history presented their products and those in attendance as well as the exhibitors stated that never in their experience had they participated in such a satisfactory and satisfying event.

It was perfectly evident that the 42,000 attendance (the highest in the 24-year history of the Congress and Exposition) was very seriously interested in the new aids to production on display and made a very close, definite and interested study as to how the particular material or machine could aid in eliminating obstacles to an increased flow of products needed for defense.

ENCYCLOPEDIA

Sometimes a crisis has a tendency to demonstrate the importance of some particular product or service and this indeed is true with reference to the A.S.M.'s National Metals Handbook. For some 20 years the Society and its members have been working, collecting and gradually perfecting the material contained in its 1800 pages. The book has gone through a number of editions and thousands of members of the Society have contributed in the preparation and review of its sub-



ject matter until each succeeding edition became more and more an encyclopedia of metal knowledge and more and more a ready source of the latest and correct information on metals.

From the beginning of the defense preparation period and on into the present war effort the book has been more and more recognized as a ready and handy reference for

the saving of time and as a source book of knowledge and authoritative information on every aspect of the metal field.

The Society takes considerable pride in the recognition granted to this volume (called "The Bible of the Metal Industry") and knows that the members also feel fully compensated for the hours and years of effort and time expended in the preparation of the material in this book which has achieved such an authoritative place in the literature now helpful to the war effort.

What has been said of the National Metals Handbook may be said to a lesser degree of many other books of the Society, indicating that the selection of the subject matter which has been published and made available for members could not have had closer scrutiny or a better choice if it were being selected entirely for the purpose of furnishing information and assisting in the preparation of individuals and industry for a crisis such as the world is experiencing at the present time.

METAL PROGRESS

METAL PROGRESS, the monthly magazine of the A.S.M. has for 12 years brought the latest developments in metals, alloys, furnaces,



equipment, methods and supplies to the members of the Society not only by readable texts but by attractive advertising. This essential activity is being continued through the emergency.

The editor, Ernest E. Thum, sensed in 1940 the greater need for information of value to inspectors and testing engineers, and throughout that year numerous practical and valuable articles on this general subject were added to the reading pages.

During that year the problem of metal shortages began to crop up. In the February 1941 issue was the first inclusive article on the apparent supply and demand for critical metals. Mr. Thum has merited the confidence of numerous experts attached to the Materials Division of OPM and WPB, and so has been able to present no less than 28 authoritative articles on strategic and critical metals in the period February 1941 to April 1942.

In January of 1942 a new department "War Products Consultation" was started. Each month some metallurgical problem of wide importance, considered by some of the A.S.M. War Products Advisory Committees, is stated, a general reply is made, and a special critique appended signed by a recognized expert in that branch of the profession.

Altogether in the 15 months ending April 1942, no less than 368 editorial pages have been devoted to the special problems of the day.

ASM-WPAC'S

The most recent activity in which the A.S.M. is engaged has been that of the War Products Advisory Committees. Forty-one chapters of the Society have accepted the recommendation of the Board of Trustees for the formation of a local WPAC whose purpose it is to give counsel and advice without cost or obligation to all plants within its sphere of influence, manufacturing war products or materials used or needed in the manufacture of these items.

These ASM-WPAC's have been

organized a sufficient time to demonstrate definitely the important part they are playing in the present emergency. Some chapter committees have had as many as 75 problems presented to them. Each chapter organized has reported instances in which they have been



able to be of assistance to manufacturers either on the problem of war products or in the change-over from peacetime to wartime production.

These War Products Advisory Committees have been cordially received by the army, navy, ordnance, aircraft procurement, WPB, and all branches of the government as well as doubly welcomed by industry. The wide scope of service for which these committees are equipped, the extensive, diversified ability and training of the 985 members backed by the combined membership (14,645) of the A.S.M. will constitute a helpful and continuing source of information and advice in this time of need.

NE STEELS

The secretary of your Society was invited to Washington to confer as to the manner in which the War Products Advisory Committees could cooperate in disseminating information relative to NE steels and to assist in securing consumer acceptance of these new products. The speed and energy with which the ASM-WPAC committees directed their activities toward the accomplishment of these purposes was commendable and secured hearty praise from those in authority.

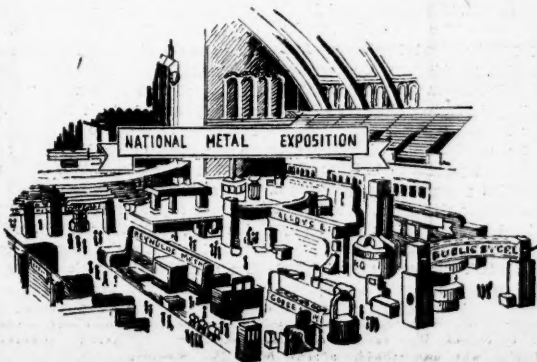
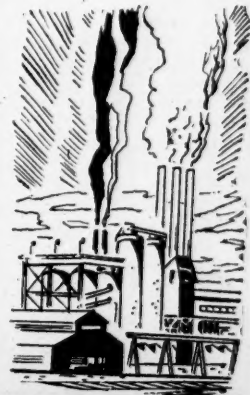
Special chapter meetings in which all other engineering society members were invited to attend were conducted on the subject of these steels, and proved very helpful to the government and to industry.

Recognizing that the low alloy steels represent an important phase in the industrial set-up, METAL PROGRESS has consistently published information relative to these new steels. Consequently when the call came from the War Production Board the editor, E. E. Thum, was able to collect and edit this material which the Society published and distributed as a 38-page pamphlet, which carried a letter of commendation from Chairman Donald M. Nelson.

This pamphlet has gone through five printings, two revisions, and over 12,000 copies have been distributed.

The A.S.M. wishes no thanks or praise for any of the activities or services of the past, present or future. Indeed, the officers, the trustees and members feel privileged to march and work side by side with industry.

There's a job to be done—and the A.S.M. enlists for the duration.



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Scarcity—the Result of War— Precipitates New Group of NE Steels

Reported by Charles Nagler

Metallographic Laboratory, Twin Cities Ordnance Plant, Federal Cartridge Corp.

North West Chapter—Lewis S. Bergen, associate director of metallurgy and research of the Crucible Steel Co. of America, opened a discussion of the NE steels by stating that we are at war and the ultimate result of war is scarcity; this scarcity can be wholly attributed to insufficient plant capacity and insufficient raw materials.

Mr. Bergen addressed the September meeting, held in the spacious dining room of the St. Anthony Commercial Club in Minneapolis on Sept. 10. The meeting was preceded by a superb smorgasbord dinner.

As far as the scarcity in the ferrous industries is concerned, we can trace it back to the origin of the raw material for the blast furnaces. We have insufficient plant capacity to produce the required steel—and one of the larger factors is that we have insufficient alloying elements available in the United States to supply our war demands.

The scarcity of these materials

has precipitated a new group of steels, now referred to as the National Emergency (NE) steels.

There are several types of steel that can be purchased on the market today. These are only available with the proper priority ratings. They include the NE 8600, 8700, 8949, and 9400, 9500, and 9600 steels.

The physical properties of the three first-mentioned steels have been investigated and published by the large steel mills of the country, and Mr. Bergen had prepared an excellent group of charts giving the tensile strength, elongation, reduction of area, and Izod impact.

A complete study was made of the hardenability of the steels and an attempt was made to correlate the chemistry of these steels with the hardenability data. In all cases, it was gratifying to learn that the NE steels have comparable physical properties to the SAE steels. The consumer is thus able to use the substitutes quite conveniently.

Employment Service Bureau

Address answers cure A.S.M., 7301 Euclid Ave., Cleveland, unless otherwise stated.

POSITIONS OPEN

WELDING ENGINEER: For manufacturer of high pressure boilers, pressure vessels, stainless steel equipment and welded fabrication. 25 welding machines; X-ray and stress relieving facilities. Applicant should be familiar with welding and X-ray technique, heat treatment and physical testing. Edge Moor, Del. Box 11-5.

STUDENT INSTRUCTORS AND JUNIOR INSTRUCTORS: For Army Air Forces Technical Schools and Navy Aviation Service Schools. Application forms may be secured from U.S. Civil Service Commission, Washington, D. C., or from Secretary, Board of United States Civil Service Examiners, Chanute Field, Rantoul, Ill.

METALLOGRAPHER: Engineering school graduate with knowledge of constitution diagrams and experience in preparation of specimens, use of high power microscopes, dark room technique. Salary open. 100% defense work; Toledo, Ohio. Box 11-15.

METALLURGIST: Well-qualified man with extended experience with stainless, tool, and alloy steels. Must be able to assume responsibility and direct laboratory organization. Excellent opportunity. Pennsylvania. Box 11-20.

INSTRUCTORS: Two young metallurgists, one for instructor in process metallurgy, one for physical metallurgy. Midwest engineering college. Salary open. Box 11-80.

METALLURGIST: Electric furnace experience, for steel and iron foundry working on war products. In reply state draft status. Salary commensurate with ability and experience. Tennessee. Box 11-30.

ANALYTICAL CHEMISTS: For supervisory and routine work. Previous experience desirable but not required. Applications not solicited from persons already employed in war work. New England. Box 11-35.

SALESMAN: With die and tool steel experience, preferably in Philadelphia area. Deferred draft status. Application should include complete details on personal information, education, experience, references, etc. Box 11-40.

METALLURGIST: Experienced in research and development of magnesium alloys; capable of conducting independent research, and having some experience in production methods for light alloys. Give details of education, experience, publications, references. State age, salary desired. Send small photograph (not returnable). Box 10-35.

U.S. NAVAL RESERVE is seeking qualified engineers with excellent educational background and experience in field work for direct commission appointments. Need for well-qualified men is urgent. Your application will be forwarded to Office of Naval Officer Procurement in closest city. Box 11-45.

METALLURGIST: To supervise heat treatment of alloy steel bars. Ordnance work in Akron district. Box 11-25.

METALLURGIST: Should have knowledge of chemistry of carbon and alloy steels, rolling defects, forging, heat treatment, testing, and pyrometric control. Salary open. 100% defense plant. Toledo, Ohio. Box 11-10.

SUPERINTENDENT: For heat treating department of steel mill in central Ohio, involving annealing and heat treatment of steel mill products, shafting, heavy forgings, gun forgings, etc. State qualifications and draft status. Box 11-90.

POSITIONS WANTED

METALLURGICAL ENGINEER: Ph.D. Desires position as chief metallurgist or in charge of research and development in ferrous field. Industrial and teaching experience. Box 11-50.

METALLURGIST: Graduate: 23 years' practical experience in melting, processing and research of electric alloy steels. Thorough worker and efficient organizer. Age 42; draft exempt. Available immediately. Box 11-55.

METALLURGICAL ENGINEER: 21 years of industrial experience; exceptionally qualified for service in consulting or executive capacity. Age 42; no draft classification. Box 11-60.

METALLURGIST: 7 years broad metallurgical experience in steel production (Chicago area). Would consider metallurgical or production supervisory position with steel producer or user. Box 11-65.

METALLURGIST: Would like position as foreman, assistant to department superintendent, chemist or metallurgist in steel producing or non-ferrous plant. Thorough training at University of California and University of Minnesota; experience in steel plant and foundry; most recent experience in ore handling. Would like to return to metallurgical field. Box 11-70.

METALLURGIST: 30 years old; graduate of Rensselaer Polytechnic Institute. Experience in tool steels, production steels, special alloy steels, stainless, and some non-ferrous; inspection, testing, research and shop problems. Salary open. Box 11-75.

METALLURGIST: Would like place as principal assistant in non-ferrous laboratory where can broaden experience in metallurgy and metallography, preferably in research and development. Nine years analytical experience; four additional years in chemical engineering. Draft exempt. Cleveland area (100-mile radius) preferred. Box 8-15.

METALLURGIST: 31. Carnegie Tech graduate, 8 years' experience in large steel plant in mills, control laboratory, trouble shooting. Evening class instructor in large university. Midwest. Box 11-85.

Officiate at "Foundry Night"



Leaders at Worcester Chapter's Foundry Night Were, Left to Right: Paul F. Pfau, Chapter Chairman; Harold H. Judson, Foundry Superintendent, Gould Pumps, Inc., Principal Speaker; and Edwin C. Meyer of Arcade Malleable Iron Co., Technical Chairman.

Brittle Chips Point to Good Machinability

Reported by P. H. Parker

Metallurgist
Continental Roll & Steel Foundry Co.

Calumet Chapter—The pertinent subject of the effect of gas rationing on future chapter meetings was discussed briefly at the opening of the meeting on Oct. 20. Suggestions for a more accessible meeting place were discussed, and Chairman Drapeau appointed H. H. Feierabend head of a committee to study this problem.

In a talk on "Screw Machine Steels", A. S. Jameson, works metallurgist, West Pullman Works, International Harvester Co., covered the machinability of these steels as measured by speeds, tool wear, and finish.

He pointed out that a good machining steel is one in which the structure permits the tool to remove brittle chips. The four main factors that produce this characteristic are high sulphur and phosphorus, large grain size, cold work, and lead additions.

Sulphides Embrittle Ferrite

High sulphur promotes good machinability because of the presence of sulphides that embrittle the ferrite constituent. In steels heat treated to produce coarse grains there are larger pearlite areas in which chip breakage can begin.

Cold working also embrittles the ferrite. Strain aging at 600 to 800° F. after cold drawing also improves machinability.

Mr. Jameson called attention to the increase in tool wear arising from the presence of abrasive inclusions such as aluminum oxide and silicates in machining steels. It has been found that steels deoxidized with titanium, for instance, cause 10 to 15% less tool wear than those deoxidized with silicon and aluminum additions.

With the exception of leaded steels, those which depend on other methods of promoting good machinability have poor physical properties. In turn, one of the big problems today is to obtain shell steels with good physical properties and also good machinability.

Slides, Samples Show Various Types of Gages

Reported by W. J. Kollas

Chief Engineer
Montag Stove & Furnace Works

Oregon Chapter—A special meeting on Oct. 21 was sponsored jointly by the A.S.M. and American Society of Mechanical Engineers. Louis Lingier, speaking on "Gaging Practices in Modern Industry", discussed briefly the historical aspect of gages for inspection work.

He amplified his description to cover the present main types of inspection gages, namely, plug gages, snap gages, ring gages, thread gages, visual gages, multiple check gages and electrical optical gages.

His talk was made more interesting by slides depicting the use of gages, and also by a number of examples of various types of gages for demonstration work.

Judson Speaks on High Test Cast Iron

Reported by John R. Dobie

American Steel & Wire Co.

Worcester Chapter—"High Test Iron Castings" was the subject for Foundry Night on Oct. 15. Harold H. Judson, foundry superintendent of Gould Pumps, Inc., Seneca Falls, N. Y., gave the talk.

Mr. Judson told of his own experience in making low carbon, non-alloyed iron. The methods of carbon control, special cupola design, and other details were covered. A lively and lengthy discussion showed the interest with which his audience had followed every word.

The meeting was held at Sanford Riley Hall, Worcester Polytechnic Institute. Admiral Wat Tyler Cluverius, U.S.N., ret., W.P.I. president, extended the Institute's greetings to the speaker. Mr. Judson was graduated from Tech in mechanical engineering in 1923.

Other speakers were Paul F. Pfau, Chapter chairman; Edwin C. Myer, technical chairman for the meeting; and George H. Campbell, Chapter secretary.

Mr. Pfau called attention to registration for the evening metals course to be conducted by Prof. Carl G. Johnson. This course is being given under the Chapter's sponsorship.

Jones, Shepherd And Bennett Head Panel at Lehigh

Reported by Robert D. Stout

Lehigh University

Lehigh Valley Chapter—The year's program was opened on Oct. 2 by a semi-panel discussion on NE steels.

W. H. Jones of the Bethlehem Steel Co. led the panel by summarizing the chemical analysis ranges of these steels and commenting on their hardenability and physical properties as compared to some of the SAE steels that they replace.

B. F. Shepherd of Ingersoll-Rand Co. pointed out that comparisons between steels of physical properties obtained from uniform test pieces are sometimes nullified by inability to harden the steel in one piece in practice. He went on to describe quenching methods using fused salts as coolants, which avoid the temperature gradients responsible for cracking.

Bethlehem Uses 20 Steels

E. V. Bennett of the Bethlehem Steel Co. described the efforts of his company to simplify the list of NE steels by the selection of some 20 of them to serve as a complete set of substitutes for the SAE steels.

He also stated that it appears that the Jominy tests of these steels can be divided into some nine "hardenability zones". This follows the increasing tendency to specify steels on the basis of hardenability and physical properties rather than on simple chemical analysis.

It was apparent from the discussion that, while the use of the NE steels introduces the usual difficulties accompanying such a change, on the whole they are excellent substitutes and may eventually displace permanently some of the SAE steels higher in alloy content.

Applications Of Induction Method Widen

Reported by R. L. Rickett

U. S. Steel Corp. Research Laboratory

New Jersey Chapter started the 1942-43 season on Sept. 21 with the first of a series of meetings arranged to give the members practical information on a number of topics related to the war production program.

The subject, "Induction Hardening", was to have been presented by W. E. Benninghoff and H. B. Osborn, Jr., of the Tocco Division, Ohio Crankshaft Co., Cleveland. Mr. Benninghoff set a record for brevity when he informed his audience that, due to the devastating effects of a cold, he would have to shift the burden of his portion of the program to his colleague.

Evidence of the success with which Dr. Osborn fulfilled his mission was the attention given him by the large group present, and the active and pertinent discussion that followed.

Crankshafts First Application

According to the speaker, the use of induction hardening resulted from efforts to produce better crankshafts. After being successfully developed for this purpose, use of the process spread to many other products and the method is now being employed in applications which even a few months ago seemed impractical. A number of slides were shown, some having to do with the manufacture of materials of war. Few details could be given concerning these applications, of course.

The principles of the process, as stated by Dr. Osborn, are essentially the same regardless of the application. Any metal placed in a high frequency alternating field becomes heated. In magnetic materials some of the heat produced comes from hysteresis losses in the material; in actual practice, though, this source of heat is of negligible importance.

Most of the heat generated, all of it in non-magnetic metals, comes from eddy currents induced in the material by the changing magnetic field. In a high frequency field these induced currents are confined largely to the surface layers of the enclosed metal.

The apparatus used for induction hardening is composed essentially of an inductor which consists of a single-turn, water-cooled coil, and a source of high frequency current. The inductor has holes through which water may be sprayed on the heated part to quench it.

Ingenious Devices Handle Paris

The source of high frequency current may be a motor generator, a spark gap oscillator or a vacuum tube oscillator. Ingenious and seemingly complex devices are built into the machines to handle the parts being heat treated and to carry out the proper sequence of operations.

The speaker discussed methods of controlling the process according to the maximum temperature and depth of hardening desired and the size of piece to be heat treated. The factors varied are the KW input, the frequency, and the length of time of heating.

Regarding the metallurgical aspects of the process, it was stated that complete solution of carbides is attained in from fractions of a second to a few seconds. The martensite produced on quenching is said to be more nodular in appearance than that which results from other methods of heat treatment.

The precision and ease with which this method of hardening may be performed is well expressed in the words of the speaker who stated that with it "anyone capable of pushing a button may become a heat treater".

An interesting talk on the history and functions of the New York State Police by Lieut. Charles La Forge followed the dinner and preceded Dr. Osborn's lecture.

Five Experts Lead Cleveland NE Meeting

Reported by Waldemar Naujoks
Chief Engineer
Steel Improvement & Forge Co.

Cleveland Chapter—Five speakers were on the program for a special meeting on National Emergency steels, held at the Cleveland Club in September. Harry Pulsifer, metallurgist, American Steel Treating Co., acted as technical chairman.

The meeting was opened by E. E. Thum, editor, METAL PROGRESS, who traced the causes of present alloy shortages. While 90% of the world's nickel is available to the Allies, this is not enough to meet requirements.

Thum Gives Figures on Supplies

He presented an interesting picture of the sources of other alloys that have been cut off and indicated potential domestic mines to replace them, at least partially. He presented figures on available supplies of various alloys and the need for NE steels—especially those using little more than recoverable alloy from scrap—to spread these alloys over present steel requirements.

George B. Ross, metallurgist at the Cleveland plant, Chicago Pneumatic Tool Co., followed and compared the various properties of NE 8620 with the old SAE 2315 and 4620. His picture was encouraging, for the case depth, core strength, and case hardness compare favorably with the SAE steels and the machinability is better. He believed that NE 8620 will adequately replace SAE 2315 and 4620.

More Data Needed on Mn-Mo

G. Harris Griffiths, metallurgist, National Acme Co., indicated that the medium hardening NE steels will serve satisfactorily in their range of requirements, but cautioned that residuals must be watched in steels with high carbon and manganese. He believes that more must be known about the manganese-molybdenum steels before they can be considered as good substitutes.

Warren A. Silliman, metallurgist, Cleveland Tractor Co., presented a short colored film on the Jominy end-quench test, which had been taken by Mr. Van Dyke, the final speaker.

Mr. Silliman said that, on the basis of the end-quench test for the steels tested, it would appear that 4063, 4140, 8744, 9260 and 3140 would be interchangeable, since the hardness curves fall very close together, although it might be necessary to alter the heat treatment slightly in some cases.

NE 8749 appears to be a good substitute for 4150 and NE8949 has

HERE AND THERE WITH A.S.M. MEMBERS

ELEVATED to the post of assistant directors of Aluminum Research Laboratories are E. H. DIX, Jr., chief metallurgist, and



E. H. Dix, Jr.

R. L. TEMPLIN, chief engineer of tests. Mr. Dix, a 1914 Cornell graduate, has been with Alcoa since 1923, chief metallurgist since 1930. For the first six years after graduation he was employed by a number of industrial firms in the east and in 1920 became chief of the metals branch of the engineering division of the Air Corps at McCook Field, Dayton, Ohio, where he served three years.

As all A.S.M. members know, Mr. Dix is an authority on the metallurgy of aluminum.

Richard Templin's association with the Aluminum Co. dates back even farther—to 1919. His previous employment, after graduation from University of Kansas in 1915, was at the National Bureau of Standards, where he was well grounded in the testing of metals.

An outstanding authority on testing methods and apparatus, he has many scientific honors, including the Charles B. Dudley medal of the American Society for Testing Materials and the Edward Longstreth medal awarded by the Franklin Institute.

THE Henry Marion Howe Medal of the American Society for Metals was presented this year to WALTER A. SCHLEGEL, metallurgical department, Carpenter Steel Co., Reading, Pa.

A hardness curve comparable to 4340. Even plain carbon steels can be given high strength and toughness by special heat treatment.

Greswold Van Dyke, manager, special steels department, Joseph T. Ryerson & Son, Inc., Chicago, was the final speaker. He pictured the function of the steel warehouse in the NE set-up. According to Mr. Van Dyke, the new 9400 series offers very promising results on the basis of the information then available.

The meeting was concluded by a lively question period in which much additional information was developed. The dinner served at 6:30 was attended by 150 members, and nearly 400 were present at the meeting.



W. A. Schlegel
Henry Marion Howe Medalist

lurgical department, Carpenter Steel Co., Reading, Pa.

Awarded for the best paper to be published in the Society's TRANSACTIONS during a stated period of time, the medal was given to Mr. Schlegel during the annual dinner of the Society held at the Statler Hotel in Cleveland, Oct. 15. The title of Mr. Schlegel's paper, which appeared in the September 1941 issue of TRANSACTIONS, is "Surface Carbon Chemistry and Grain Size of 18-4-1 High Speed Steels."

Mr. Schlegel has been with Carpenter Steel Co. since 1927, when he received his B.S. in Science from Dickinson College, Carlisle, Pa. During the past four years he has confined his work to practical research in heat treating.

UNDER the leadership of WILLIS T. CRAMER, assistant district metallurgist, American Steel & Wire Co., Cleveland, and ARTHUR E. FOCKE, research metallurgist, Diamond Chain & Mfg. Co., Indianapolis (a past chairman and long-time member of the Executive Committee of the Indianapolis Chapter A.S.M.), an informal organization of Ohio State University metallurgists has been undertaken. Plans were made at the annual O.S.U. Alumni Luncheon held during the National Metal Congress.

Mr. Cramer was elected president of the group and Mr. Focke secretary. Other A.S.M. members on the committee include A. F. SPRANKLE of Pittsburgh and A. R. STEVENSON of Chicago.

G. R. FITTERER of the department of metallurgy of the University of Pittsburgh has been appointed director of research of the newly formed Acid Open-Hearth Research Association. Practical and technical research on problems governing acid open-hearth steel production will be con-

ducted by Dr. Fitterer under the auspices of the University of Pittsburgh in conjunction with full study of actual furnace heats in the plants of the 19 member companies.

H. G. Grim is chairman of the Association, while F. H. ALLISON, Jr., chief metallurgist, United Engineering and Foundry Co., is vice-chairman; F. C. T. DANIELS of Mackintosh-Hemphill Co. is secretary, and R. C. HEASLETT of Continental Roll & Steel Foundry Co. is treasurer.

A.S.M. members on the Executive Committee include GEORGE S. BALDWIN, H. E. DOWIE, WALTER H. WHITE, E. H. MEBS, W. E. HARVEY, and HERMAN P. RASSBACH.

NAMED the winner of the third grand award, H. THOMASSON, welding engineer, Canadian Westinghouse Co., Ltd., A.S.M. Ontario Chapter secretary, received a prize of \$8700 in the recent \$200,000 Progress Program of the James F. Lincoln Arc Welding Foundation.



H. Thomasson

Mr. Thomasson's report showed how great savings were made in the application of arc welding to a new type of large mercury-arc rectifier.

First award in the railroad classification totaling \$3700 went to J. E. Candlin, Jr. and A. M. UNGER, assistant engineer and plant engineer, respectively, Pullman-Standard Car Mfg. Co., while VLADIMIR H. PAVLECKA, chief of research, and John K. Northrop, president, Northrop Aircraft, Inc., received first award of \$3700 in the aircraft classification.

Other A.S.M. members whose entries received awards include JOHN H. HRUSKA, Electro-Motive Division, General Motors Corp.; JAMES W. FITCH, Kenworth Motor Truck Corp.; WALTER J. BROOKING, R. G. LeTourneau, Inc.; CARLTON G. LUTTS, Boston Navy Yard, and PAUL D. FFIELD, Bethlehem Steel Co.; EDGAR BROOKER, Tank and Combat Vehicle Division, Ordnance Department; HERMAN C. FRENTZEL, The Hell Co.; J. SCHUYTEN, Shell Chemical Co.; RALPH C. DAY, Wentworth and Irwin, Inc.;



A. M. Unger



E. L. Mills, President
International Acetylene Assn.

W. H. RICE, Oklahoma Agricultural and Mechanical College; WALTER E. KLAUBERG, Wyatt Metal and Boiler Works; HAROLD F. WAHL, Willamette Hyster Co.; EDWIN JONES FREEMAN, Clemson College; FRANK K. ZANIKER, Crown Willamette Paper Co.; H. W. RUSHMER, Jeffrey Mfg. Co.; and C. F. UNDERWOOD, Jones and Laughlin Steel Corp.

ELLSWORTH L. MILLS, vice-president, Bastian-Blessing Co., Chicago, was elected president of the International Acetylene Association at the annual meeting held in Cleveland Oct. 14. Mr. Mills, a native of Denver and graduate of Cooper Union, has previously served as vice-president and director of the I.A.A.

Other officers elected at the meeting were Glenn O. Carter, consulting engineer, The Linde Air Products Co., vice-president; H. F. Reinhard, Union Carbide and Carbon Corp., secretary; and Philip Kearny, president, K-G Welding and Cutting Co., treasurer.

ASSIGNED to research and development of new products, ANSON B. ALBREE is now associated with the A.

F. Holden Co. at the West Haven, Conn., plant.

Mr. Albree is chairman of the New Haven Chapter A.S.M.-War Products Advisory Committee and has been a member of the Chapter Executive Committee for the past three years. He was formerly assistant metallurgist at Wetherell Bros. Co., Cambridge, Mass., and more recently purchasing agent and metallurgist, Bridgeport Grinding Co.



A. B. Albree

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Alloy Constructional Steels, by H. J. French	\$ 4.00
Alloying Elements in Steel, by Edgar C. Bain	4.00
Application of Science to the Steel Industry, by W. H. Hatfield	2.50
Book of Stainless Steels, Edited by Ernest E. Thum	5.00
Engineering Alloys, by N. E. Woldman and A. J. Dornblatt	10.00
Forging Handbook, by Waldemar Naujoks and Donald C. Fabel	7.50
Hardness and Hardness Measurements, by S. R. Williams	7.50
Heat Flow in Metals, by J. B. Austin	2.50
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Metallurgical Technique for Steel, by J. R. Villola	2.00
Metallurgical Dialogue, by Albert Sauveur (Autographed)	3.00

Metals—How They Behave in Service, Series of Five Lectures	1.00
Modern Steels, Series of 12 Lectures	3.50
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Tour Speaks On Gas-Rich Atmospheres

Reported by A. J. Kleiner
Foreman, Hamilton Watch Co.

York Chapter started its 13th year on Sept. 9 when Sam Tour of Lucius Pitkin, Inc., New York City, talked on "Furnace Atmospheres".

Mr. Tour covered the fundamentals of gas-rich atmospheres and showed that the products of combustion vary considerably in analysis with the temperature at which the combustion chamber is maintained.

In the case of propane, using an 8 to 1 air to gas ratio, it was shown that the formation of soot and tar at temperatures below about 1500° F. and the formation of coke over about 1900° F. leave a wide range for the practical use of this gas-rich mixture for a protective atmosphere.

In general, the H₂ and CO contents of the products increase with temperature and H₂O, CO₂ and illuminant contents decrease proportionately.

Mr. Tour pointed out the folly of attempting to remove water vapor entirely from a gas containing hydrogen and CO₂, since the combustion of hydrogen with CO₂ would produce more water vapor. It is better to lower the water vapor content of the raw gas to 2 or 3% a known value, and compensate for this amount with H₂.

The tendency toward scaling depends not on the water vapor content, but the ratio of H₂O to H₂ in the gaseous atmosphere in the same manner as the tendency toward scaling is controlled by the CO₂ to CO ratio. The tendency toward decarburization depends on the ratio of CH₄ (methane) to H₂.

Mr. Tour told of the value of recirculating the atmosphere through a drier which continuously removes excess moisture, so that the atmosphere is partly new gas and partly recirculated gas. This process keeps the water vapor at a constant lower level than would otherwise be possible.

The discussion brought out that while gas-rich atmospheres are best used in many cases for the prevention of decarburization, scale, and pitting of heat treated tools, nevertheless some tool steels are best heat treated in a slightly oxidizing atmosphere. The latter permits the formation of a thin, tight coat of scale which keeps the steel from further contact with the atmosphere and thereby renders it impervious to further attack.

Osborn is Ont. Speaker

Reported by G. L. White
Editor, Canadian Metals and Metallurgical Industries

Ontario Chapter—The first technical meeting for the 1942-43 season was held on Sept. 18 at St. Catharines, Ont. Chairman J. F. Thomlinson, Toronto Hydro-Electric System, presided over a meeting which indicated a high level of interest in the subject of "Differential Hardening by Induction".

This was presented by H. B. Osborn, Jr., research and development engineer, Tocco Division, Ohio Crankshaft Co., Cleveland. Mr. Osborn's talk is reviewed briefly on page 6.

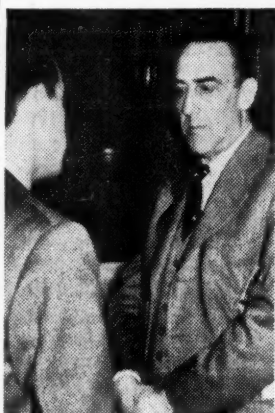
Nearly \$1,400,000.000 has been spent by the steel industry for new equipment and construction from 1935 through 1941.

Furnace Capacity Available Chicago District

Car-Hearth Furnace for Normalizing, Carburizing, Annealing and Stress Relieving.
Loading capacity—48,000 lb.
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At President's Night



A.S.M. President Herbert J. French Answers Some Questions on NE Steels at "President's Night". (Photograph by H. E. Handy).

Boston Greets President & New Ordnance Chief

Reported by C. G. Lutts

Materials Engineer, Boston Navy Yard
Boston Chapter—President's Night opened the fall season on Oct. 2 at the Hotel Sheraton.

Brigadier General Burton O. Lewis, district chief of the Boston Ordnance District, as coffee speaker, briefly stressed the importance of metallurgists in the war effort and their responsibility for recommending suitable substitutes when conventional or specified metals are restricted or unavailable.

Before the technical session, members were given an opportunity to meet the new chief of the Boston Ordnance District, to talk personally with Mr. French, and to consult with the War Products Advisory Committee.

Technical Chairman Homerberg presented President-Elect H. J. French who is now acting as Chief of the Metallurgical and Specification Section, Iron and Steel Branch.

"Steels for War and Peace" Title Of Archer's Talk at Pitt Opener

(Continued from page 1)

No two alloy combinations will have the same properties in all respects. No NE steel will be the exact equivalent of the steel which it is intended to replace. Expert metallurgical knowledge and judgment must be coupled with experience in making substitutions.

It was decided that the best useful measure of comparison for alloy steels would be their hardenability. This can be determined by the end-quench method of Jominy for deep hardening alloys or by the hardness traverse methods for the shallow hardening types. Hardenabilities can also be calculated from the data provided by Grossmann.

Hardenability Training Required

The greatest difficulty resulting from this decision was the lack of understanding of hardenability throughout the industry. Many plants, warehouses, and consumers, who had never used this specification were called upon to use it, and this required a considerable training period.

Slides were shown comparing the hardenability and other properties of many NE steels with those properties of the steels they are replacing. Archer emphasized that these published properties were measured on a limited number of heats and demonstrated the variations which may occur from heat to heat, or from ingot to ingot, and the effects of ingot segregation and prior heat treatment.

In general, substitutions have been successful when the carbon content as well as the hardenability has been kept the same as in the original steel.

All of the above-mentioned alloys involved nothing more than a re-

CHAPTER CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Dec. 11	Lord Baltimore Hotel		Christmas Party
Boston	Dec. 4	Hotel Statler	Paul D. Field	Trials and Tribulations of a Materials Engineer
Buffalo	Dec. 10	Hotel Statler	Gregory J. Constock	Powder Metallurgy
Calumet	Dec. 15	Woodmar Country Club	A. Allan Fates	Plastics Vs. Metals
Canton-Mass.	Dec. 10		John Mitchell	Deep Drawing
Chicago	Dec. 10	Chicago Bar Assoc.	Lieut.-Col. Turner	Alloys and Emergency Alloy Steels
Cincinnati	Dec. 10		H. J. French	Aircraft Developments
Cleveland	Dec. 7	Cleveland Club	Wm. B. Stout	Applications of X-Ray in Industry
Columbus	Dec. 8			Alloys and Emergency Alloy Steels
Dayton	Dec. 9	Engineers' Club	H. J. French	Christmas Party
Detroit	Dec. 14			Christmas Party
Hartford	Dec. 8			Christmas Party
Indianapolis	Dec. 11	Hotel Washington	H. J. French	Alloys and Emergency Alloy Steels
Lehigh Valley	Dec. 4	Hotel Traylor, Allentown, Pa.	John Mitchell	Effect of Elements and NE Steels
Milwaukee	Dec. 15	Milwaukee Athletic Club	Howard J. Slagg	Alloy Steels in the War Program
Montreal	Dec. 7	Windsor Hotel	W. E. Benninghoff and H. B. Osborn, Jr.	Induction Hardening and Heating
New Haven	Dec. 10	Hotel Barnum		Salt Bath Hardening
New Haven	Dec. 18	Hotel Garde	Haig Solakian	Christmas Party
New Jersey	Dec. 21	Essex House, Newark		Smoker
New York	Dec. 14	Bldg. Trade Employers Association	H. J. French	Alloy Steels
North West	Dec. 7	Coffman Memorial Union		Tool Steel
Notre Dame	Dec. 9	Univ. of Minn.	A. J. Scheid, Jr.	Hardenability and Its Measurement
Ontario	Dec. 4	Engineering Auditorium, Univ. of Notre Dame	W. E. Jominy	Salvage Welding of Tools and Machine Parts
Oregon	Dec. 18	Hotel Heathman	H. Thomasson	Christmas Meeting
Peoria	Dec. 13	Caterpillar Tractor Co.	A. L. Hartley	Applications of Flame Hardening
Philadelphia	Nov. 27	Engineers Club	R. C. Disney	Fighting Tanks for Fighting Men
Philadelphia	Dec. 22	McAllister's		Christmas Party
Pittsburgh	Dec. 10	Roosevelt Hotel		Christmas Party
Rochester	Dec. 14	Lower Strong Audit.		Copper and Copper Alloys
Rockford	Dec. 16	Elks Club	Willard S. Girvin	Annual Stag Party
St. Louis	Dec. 18	York Hotel		Christmas Party
Springfield	Dec. 7	West Springfield		Machinability of Steels—Low Alloy
Syracuse	Dec. 1	Onondaga Hotel	N. E. Wo'dman	Magnesium Alloys
Toledo Group	Nov. 23	Hillcrest Hotel	H. W. Schmidt	Christmas Party
Toledo Group	Dec. 19	Hillcrest Hotel		General Design and Mechanics of Welding
Tri-City	Dec. 8	Hotel Fort Armstrong, Rock Island, Ill.	T. MacLean Jasper	Welding Stresses
Washington	Dec. 7	Polomac Electric Power Co. Auditorium	H. W. Pierce	Corrosion Protection
Worcester	Dec. 9	Sanford Riley Hall	R. M. Burns	Grinding and Other Abrasive Applications
York	Dec. 9	Worcester Polytech. Inst.	A. G. Green	

War Production Board, in Washington. Mr. French's subject was "Alloys and Emergency Alloy Steels" in which he described the present situation with regard to National Emergency steels.

During the discussion which followed his talk, Mr. French supplied information regarding specific NE steels in which certain members were interested. The members expressed their appreciation of Mr. French's efforts with unrestrained applause.

Steel Makers Should Dehydrogenize as Well As Deoxidize—Zapffe

Reported by J. M. Gotshall

Assistant Chief Chemist
Timken Steel and Tube Division

Canton-Massillon Chapter—The numerous ways in which hydrogen may be inadvertently supplied to metals were shown by C. A. Zapffe, research metallurgist, Battelle Memorial Institute, speaking on "Hydrogen in Iron and Steel" at the meeting on Oct. 22. Hydrogen results in "bleeding", loss of ductility, "flakes", and "fisheyes".

Some means of control have been devised by the steel industry, such as slow cooling for preventing flakes in forging steel, but they are often insufficient. Flakes are plainly a result of stress operating on brittle metal, he said.

With quenching cracks, brittleness from carbide is responsible;

The first recorded attempt to produce a nickel alloy steel in the United States was made in 1890 in a Pittsburgh steel plant. Five tons of steel containing 3.2% nickel were produced in a bessemer converter, rolled into plates and then tested for suitability for use in ship hulls and as armor plate.

similarly, segregations of sulphur and phosphorus lead to brittleness and other types of cracking that are well recognized.

Flaking, according to Dr. Zapffe, is the particular type of cracking that follows from hydrogen segregation and brittleness.

He stated that research has progressed far enough to provide a positive and an immediate cure for defects such as flaking, if steel makers would only accept it seriously, and lamented the fact that steels are not dehydrogenized with the same care that they are deoxidized.

Russell W. Hadley, formerly of Goodyear Rubber Co. as managing director in Singapore and Java, immediately after dinner told of his "War Experiences in the Far East". About 100 members and guests were present at the meeting.

Of the 900 machine tools needed to make the Bofors rapid anti-aircraft cannon, 400 were taken from regular automobile assembly lines and adapted to the production of Bofors guns. Each gun comprises more than 500 individual parts.

Steel house construction reduces by two thirds the potential fuel for a fire.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

OF THE REVIEW, published monthly except July and September at Cleveland, Ohio, for October 1, 1942, State of Ohio, County of Cuyahoga, ss. Before me, a Notary Public in and for the State and county aforesaid personally appeared Ray T. Bayless, who, having been duly sworn according to law, deposes and says that he is the Editor of THE REVIEW of the American Society for Metals, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 337, Postal Laws and Regulations to wit:

1.—That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, American Society for Metals, 7301 Euclid Ave., Cleveland, O.; Editor, Ray T. Bayless, 7301 Euclid Ave., Cleveland, O.; Managing Editor, M. R. Hylop, 7301 Euclid Ave., Cleveland, O.; Business Manager, Ray T. Bayless, 7301 Euclid Ave., Cleveland, O.

2.—That the owner is: The American Society for Metals, 7301 Euclid Ave., Cleveland, O., which is an educational institution, the officers being: President, Bradley Stoughton; Vice-President, Herbert J. French; Treasurer, Francis B. Foley; Secretary, W. H. Eisenman; Trustees: E. L. Bartholomew, C. Y. Clayton, K. R. Van Horn, N. F. Tisdale, Oscar E. Harder. All officers as above, 7301 Euclid Ave., Cleveland, Ohio.

3.—That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4.—That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

Ray T. Bayless, Editor.
Sworn to and subscribed before me this 8th day of October, 1942.
(Seal) Arthur T. Wehrle, Notary Public. (My commission expires Jan. 20, 1944.)



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